

WHAT IS CLAIMED IS:

1. A display comprising:
 - a) a substrate;
 - b) transparent first conductors;
 - c) second conductors forming conductive segments;
 - d) a light modulating material disposed between said first and second conductors, having an initial state and different first and second field-changeable stable optical states;
 - e) inter-segment conductive material disposed over areas of light modulating material not covered by second conductors, said conductive material having had an applied field to write the light- modulating material in said areas into a field-changed optical state;
 - f) drive means connected to said first and second conductors and not to said inter-segment conductive material, said drive means operable to change the optical state of the light material to present an image on said display.
2. The display of claim 1 wherein the material for the inter-segment conductive material and the second conductors are common.
3. The display of claim 1 wherein material for the inter-segment conductive material is co-deposited in a layer with material for the second conductors.
4. The display of claim 1 wherein the inter-segment conductive material and the second conductors are opaque printed conductors.
5. The display of claim 1 wherein the inter-segment conductive material and second conductors are vacuum deposited.

6. The display of claim 1 wherein the light-modulating layer comprises liquid-crystal.

7. The display of claim 6 wherein said first field-changeable state is a reflective state and the liquid-crystal is essentially in a planar orientation.

8. The display of claim 6 wherein said liquid-crystal in the said areas is a background region of the display and is in a field-induced planar orientation providing a reflective state adapted to contrast with a display image in a relatively dark transmissive state.

9. The display of claim 1 wherein the light-modulating layer comprises polymer-dispersed domains of cholesteric liquid-crystal.

10. The display of claim 1 wherein between the first and second field-changeable stable optical states, the display is capable of providing a gray scale.

11. The display of claim 1 wherein the inter-segment conductive material is electrically separated from the second conductors.

12. The display of claim 11 wherein said inter-segment conductive material and said second conductors are electrically isolated by a thin and continuous region forming a narrow gap.

13. The display of claim 1 wherein the display is adapted to provide a bipolar electrical field across the first transparent conductors and second conductors.

14. The display of claim 1 further including:

- a) a dielectric layer having a through via to each second conductor; and
- b) conductive traces over the dielectric layer to interconnect selected second conductors, whereby the display may be addressed in a matrix fashion by electrically addressing the first and second plurality of contacts.

15. A display having a display driver and a display area capable of displaying a plurality of characters, each character having a character region and a background region, wherein each character region comprises a plurality of segments, said display comprising:

- a) a substrate;
- b) transparent first conductors, wherein said character region corresponds to at least one of the first conductors,
- c) second conductors patterned to have electrically separate areas corresponding to segments of the character region;
- d) at least one imaging layer comprising a light modulating material disposed between said first and second conductors, which material has the property of having a first and second field-switchable stable optical state which states correspond, respectively, to a first and second contrasting optically visible state, and which material has the further property, when coated on a substrate and before application of a electromagnetic field, of exhibiting an as-coated optical appearance that is near to the first visible state and, after being subjected to a field of exhibiting a field-induced optical appearance; and
- e) an inter-segment background element, corresponding to the background region, comprising one or more sections which may be patterned into separate areas in a character region, said background element and said second conductors covering different areas of the light-modulating layer, which background element comprises a material that is electrically conductive such that

during manufacture it is capable of electrically writing the background region into one of the optically visible states;

f) third conductors connected to second conductors in more than one character region;

wherein the display is predesigned such that, during use, the background element cannot be used to electrically write the background region into one of the optically visible states employing a display driver and/or using third conductors.

16. A display having a display area capable of displaying a plurality of characters in a background, the characters including a plurality of segments, comprising:

a) a first patterned conductor layer having electrically separate areas defining character regions;

b) a layer of light modulating material located over the first patterned conductor layer;

c) a second patterned conductor layer located over the layer of light modulating material and having electrically separate areas defining the segments of the characters;

d) inter-segment background conductors located in the same layer as the second patterned conductor layer over the layer of light modulating material and having electrically separate areas defining the background;

e) optionally a dielectric layer located over the second patterned conductor layer, the dielectric layer defining holes over at least each segment of the second patterned conductor layer;

f) a third patterned conductor layer defining a plurality of conductors connected to the areas defining the character segments in the second patterned conductor; at least one of the conductors being connected to a segment in more than one character; and

whereby the display may be addressed in a matrix fashion by electrically addressing, via electrical contact with the conductors in the third patterned conductor layer, the first and second patterned conductor layers, but wherein the inter-segment background conductors defining background is not electrically addressable via electrical contact with the conductors in the third patterned conductor layer.

17. The display of claim 16, wherein the background area is a single electrically connected area.

18. The display of claim 16, wherein the background area comprises a plurality of electrically separated areas that are electrically connected by a conductor in the third conductor layer.

19. The display of claim 16, wherein the light-modulating material comprises domains of chiral-nematic liquid crystal dispersed in a polymer matrix.

20. A method of making a display having a display area capable of displaying a plurality of characters in a background, the characters including a plurality of segments, comprising the steps of:

- a) providing a substrate;
- b) forming a first patterned conductor layer on the substrate having electrically separate areas defining character regions;
- c) depositing a layer of light-modulating material over the first patterned conductor layer;
- d) forming a second patterned conductor layer over the layer of light modulating material and having electrically separate areas defining the segments of the characters and the background;
- e) forming inter-segment background conductors located in the same layer as the second patterned conductor layer over the layer of light

modulating material and having electrically separate areas defining the background;

f) optionally depositing a dielectric layer over the second patterned conductor layer, the dielectric layer defining holes over each segment; and

g) forming a third patterned conductor layer defining a plurality of conductors connected to the areas defining the character segments in the second patterned conductor; at least one of the conductors being connected to a segment in more than one character, whereby the display may be addressed in a matrix fashion by electrically addressing the first and second patterned conductors;

h) employing the inter-segment background conductors to electrically change the as-coated or heated light-modulating material controlled by said conductors to one of two contrasting optical states;

connecting the display to a driver capable of addressing the display in a matrix fashion by electrically addressing, via electrical contact with the conductors in the third patterned conductor layer, the first and second patterned conductor layers, but wherein the inter-segment background conductors defining background is not electrically addressable by the driver via electrical contact with the conductors in the third patterned conductor layer.

21. The method of claim 20 wherein a voltage is applied to the background element to create an electric field in a corresponding area of the light-modulating layer followed by deposition of a layer of a dielectric material.

22. The method of claim 21 wherein the voltage is applied to the entire all the conductors in the display area.

23. The method of claim 20 wherein prior to step (g) the display is heated to convert the light-modulating material controlled by the background element to a relatively dark optical state.

24. The method of claim 20, wherein the background area is a single electrically connected area.

25. The method of claim 20, wherein the background area comprises a plurality of electrically separated areas that are electrically connected by a conductor in the third conductor layer.

26. The method of claim 20 wherein the material for the inter-segment background conductors is co-deposited with the material for the second conductor layer.

27. The method of claim 20 wherein the light-modulating material is a cholesteric liquid-crystal material that is coated over a substrate or underlayer.

28. The method of claim 27 wherein, in step (g), the inter-segment background conductors writes the as-coated cholesteric material into a planar reflective state.

29. The method of claim 27 wherein, prior to step (g), the cholesteric material in the display is heated to convert it into a relatively dark near focal-conic state and, in step (g), an electrical field is applied across the transparent first conductors and inter-segment background conductors to write the converted cholesteric material into a more pure focal-conic state.

30. The method of claim 27 wherein in step (g), the cholesteric liquid crystal material in at least the areas of the display under the control of the inter-segment background conductors are subjected to an electric field to induce a planar reflective state.